REMARKS

In accordance with the foregoing, the specification has been amended to improve form and provide improved correlation with the drawings and claims. Claims 6, 12, 17, 18, and 26 have been amended to fix grammatical mistakes. Claims 1-30 are pending and under consideration. No new matter is presented in this Amendment.

REJECTIONS UNDER 35 U.S.C. §103:

Claims 1-30 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kim (U.S. Publication No. 20030104788) in view of Tong (U.S. Patent No. 3,728,678) and further in view of the published paper "Efficient Encoding of Low-Density parity-Check Codes" by Richardson et al (hereinafter "Richardson"). The Applicants respectfully traverse the rejection and request reconsideration.

Regarding the rejection of independent claim 1, it is noted that claim 1 recites a reordering of a plurality of columns of the parity check matrix "based on elements in each of the columns having values of one." In contrast, the reference to Kim only teaches a parity check matrix for which "some rearrangement of the columns might be necessary." That is, though Kim discloses a rearrangement of columns, a rearrangement of columns **based on elements having values of one** is not taught by Kim. Therefore, the Applicants respectfully submit that Kim fails to disclose, implicitly or explicitly, a rearrangement of the columns "based on elements in each of the columns having values of one," as recited in claim 1.

Furthermore, the Examiner cites col. 4, line 51 through col. 5, line 29 of Tong as evidence that the determining of a cross-point to generate a triangular matrix is well known in the art. However, Tong discloses a parity triangle that "is a matrix derived from the coefficients of the generator polynomial" wherein "each row from the bottom upward is the preceding row simply shifted one place to the left" and "columns to the left of the leftmost bit position of the bottom row have been deleted." Contrary to Tong, claim 1 recites: a determining of a cross-point between a diagonal line of a parity matrix part in the parity check matrix and a reordered diagonal line defined by a first entry of an element having a value of one in each column of the reordered parity check matrix; and a performing of column permutations on the reordered parity check matrix on the basis of positions of elements having a value of one in rows above a horizontal line that passes through the cross-point to generate a triangular matrix. That is, the generating of the triangular matrix as recited in claim 1 is patentably distinct from the triangular matrix disclosed by Tong, which is generated by shifting preceding rows one place to the left and

deleting a leftmost column as opposed to column permutations based on a cross-point of diagonal lines and elements having a value of one. The Applicants respectfully submit that Tong fails to implicitly or explicitly disclose, teach, or suggest a triangular matrix generated by determining a cross-point between diagonal lines of the parity check matrix and rearranging columns based on the positions of elements above a horizontal line passing through the cross-point, as recited in claim 1.

Regarding the rejections of claims 2-5, it is noted that these claims depend from claim 1 and are, therefore, allowable for at least the reasons set forth above.

Regarding the rejection of independent claim 6, it is noted that claim 6 recites a reordering of a plurality of columns of the parity check matrix "based on elements in each column having values of one." In contrast, the reference to Kim only discloses a parity check matrix for which "some rearrangement of the columns might be necessary." That is, though Kim discloses a rearrangement of columns, a rearrangement of columns **based on elements having values of one** is not taught by Kim. Therefore, the Applicants respectfully submit that Kim fails to disclose, implicitly or explicitly, a rearrangement of the columns "based on elements in each column having values of one," as recited in claim 6.

Furthermore, the Examiner cites col. 4, line 51 through col. 5, line 29 of Tong as evidence that the determining of a cross-point to generate a triangular matrix is well known in the art. However, Tong discloses a parity triangle that "is a matrix derived from the coefficients of the generator polynomial" wherein "each row from the bottom upward is the preceding row simply shifted one place to the left" and "columns to the left of the leftmost bit position of the bottom row have been deleted." Contrary to Tong, claim 6 recites: a determining of a cross-point between a diagonal line of a parity matrix part in the parity check matrix and a reordered diagonal line defined by a first entry of an element having a value of one in each column of the reordered parity check matrix; and a performing of column permutations on the reordered parity check matrix on the basis of positions of elements having a value of one in rows above a horizontal line that passes through the cross-point to generate a triangular matrix. That is, the generating of the triangular matrix as recited in claim 1 is patentably distinct from the triangular matrix disclosed by Tong, which is generated by shifting preceding rows one place to the left and deleting a leftmost column as opposed to column permutations based on a cross-point of diagonal lines and elements having a value of one. The Applicants respectfully submit that Tong fails to implicitly or explicitly disclose, teach, or suggest a triangular matrix generated by determining a cross-point between diagonal lines of the parity check matrix and rearranging

columns based on the positions of elements above a horizontal line passing through the cross-point, as recited in claim 6.

Moreover, the Examiner cites FIG. 6 and col. 10, lines 8-47 of Tong as evidence that the permutation of rows and columns based on the positions of elements having a value of one in the rows under a horizontal line passing through the cross-point to form an extended triangular matrix is well known in the art. However, it is noted that FIG. 6 and col. 10, lines 8-47 do not disclose, either implicitly or explicitly, a generation of a triangular matrix or extension of a triangular matrix; rather, FIG. 6 and col. 10, lines 8-47 disclose a "correction of errors in a code," and, specifically, a transmission of "an arbitrary stream of information bits... including two random errors" and "the manner in which [an] output signal corrects the erroneous bits in the received data stream." As discussed above, the parity triangle disclosed by Tong (col. 4, line 51 through col. 5, line 29) "is a matrix derived from the coefficients of the generator polynomial" wherein "each row from the bottom upward is the preceding row simply shifted one place to the left" and "columns to the left of the leftmost bit position of the bottom row have been deleted." The triangular matrix generated in claim 6 is distinguished from the parity triangle of Tong for the reasons discussed above. Furthermore, after careful review of Tong, the Applicants respectfully submit that Tong fails to implicitly or explicitly disclose, teach, or suggest an extended triangular matrix formed by performing row and column permutations for rows under a horizontal line passing through the cross-point on the basis of positions of elements having a value of one, as recited in claim 6.

Regarding the rejections of claims 7-11, it is noted that these claims depend from claim 6 and are, therefore, allowable for at least the reasons set forth above.

Regarding the rejection of independent claim 12, it is noted that claim 12 recites a parity check matrix generator reordering columns of the parity check matrix "based on elements in each column having elements with a value of one." In contrast, the reference to Kim only teaches a parity check matrix for which "some rearrangement of the columns might be necessary." That is, though Kim discloses a rearrangement of columns, a rearrangement of columns **based on elements with a value of one** is not taught by Kim. Therefore, the Applicants respectfully submit that Kim fails to disclose, implicitly or explicitly, a rearrangement of the columns "based on elements in each column having elements with a value of one," as recited in claim 12.

Furthermore, the Examiner cites col. 4, line 51 through col. 5, line 29 of Tong as evidence that the triangular matrix generator for determining a cross-point to generate a

triangular matrix is well known in the art. However, Tong discloses a parity triangle that "is a matrix derived from the coefficients of the generator polynomial" wherein "each row from the bottom upward is the preceding row simply shifted one place to the left" and "columns to the left of the leftmost bit position of the bottom row have been deleted." Contrary to Tong, claim 12 recites: a triangular matrix generator for determining a cross-point between a diagonal line of a parity matrix part in the parity check matrix and a reordered diagonal line defined by a first entry of an element having a value of one in each column of the reordered parity check matrix; and for performing column permutations on the reordered parity check matrix on the basis of positions of elements having a value of one in rows above a horizontal line that passes through the cross-point to generate a triangular matrix. That is, the generating of the triangular matrix as recited in claim 12 is patentably distinct from the triangular matrix disclosed by Tong, which is generated by shifting preceding rows one place to the left and deleting a leftmost column as opposed to column permutations based on a cross-point of diagonal lines and elements having a value of one. The Applicants respectfully submit that Tong fails to implicitly or explicitly disclose, teach, or suggest a triangular matrix generated by determining a cross-point between diagonal lines of the parity check matrix and rearranging columns based on the positions of elements above a horizontal line passing through the cross-point, as recited in claim 12.

Regarding the rejections of claims 13-16, it is noted that these claims depend from claim 12 and are, therefore, allowable for at least the reasons set forth above.

Regarding the rejection of independent claim 17, it is noted that claim 17 recites a parity check matrix generator reordering columns of the parity check matrix "based on elements in each column having values of one." In contrast, the reference to Kim only teaches a parity check matrix for which "some rearrangement of the columns might be necessary." That is, though Kim discloses a rearrangement of columns, a rearrangement of columns **based on elements having a value of one** is not taught by Kim. Therefore, the Applicants respectfully submit that Kim fails to disclose, implicitly or explicitly, a rearrangement of the columns "based on elements in each column having values of one," as recited in claim 17.

Furthermore, the Examiner cites col. 4, line 51 through col. 5, line 29 of Tong as evidence that the triangular matrix generator for determining a cross-point to generate a triangular matrix is well known in the art. However, Tong discloses a parity triangle that "is a matrix derived from the coefficients of the generator polynomial" wherein "each row from the bottom upward is the preceding row simply shifted one place to the left" and "columns to the left of the leftmost bit position of the bottom row have been deleted." Contrary to Tong, claim 17

recites: a triangular matrix generator for determining a cross-point between a diagonal line of a parity matrix part in the parity check matrix and a reordered diagonal line defined by a first entry of an element having a value of one in each column of the reordered parity check matrix; and for performing column permutations on the reordered parity check matrix on the basis of positions of elements having a value of one in rows above a horizontal line that passes through the cross-point to generate a triangular matrix. That is, the generating of the triangular matrix as recited in claim 17 is patentably distinct from the triangular matrix disclosed by Tong, which is generated by shifting preceding rows one place to the left and deleting a leftmost column as opposed to column permutations based on a cross-point of diagonal lines and elements having a value of one. The Applicants respectfully submit that Tong fails to implicitly or explicitly disclose, teach, or suggest a triangular matrix generated by determining a cross-point between diagonal lines of the parity check matrix and rearranging columns based on the positions of elements above a horizontal line passing through the cross-point, as recited in claim 17.

Moreover, the Examiner cites FIG. 6 and col. 10, lines 8-47 of Tong as evidence that a column permutator to permutate rows and columns based on the positions of elements having a value of one in the rows under a horizontal line passing through the cross-point to form an extended triangular matrix is well known in the art. However, it is noted that FIG. 6 and col. 10, lines 8-47 do not disclose, either implicitly or explicitly, a generation of a triangular matrix or extension of a triangular matrix; rather, FIG. 6 and col. 10, lines 8-47 disclose a "correction of errors in a code," and, specifically, a transmission of "an arbitrary stream of information bits... including two random errors" and "the manner in which [an] output signal corrects the erroneous bits in the received data stream." As discussed above, the parity triangle disclosed by Tong (col. 4, line 51 through col. 5, line 29) "is a matrix derived from the coefficients of the generator polynomial" wherein "each row from the bottom upward is the preceding row simply shifted one place to the left" and "columns to the left of the leftmost bit position of the bottom row have been deleted." The triangular matrix generated in claim 17 is distinguished from the parity triangle of Tong for the reasons discussed above. Furthermore, after careful review of Tong, the Applicants respectfully submit that Tong fails to implicitly or explicitly disclose, teach, or suggest a column permutator to form an extended triangular matrix by performing row and column permutations for rows under a horizontal line passing through the cross-point on the basis of positions of elements having a value of one, as recited in claim 17.

Regarding the rejections of claims 18-20, it is noted that these claims depend from claim 17 and are, therefore, allowable for at least the reasons set forth above.

Regarding the rejection of independent claim 21, it is noted that claim 21 recites a reordering of a plurality of columns of the parity check matrix "based on values of elements in the columns." In contrast, the reference to Kim only teaches a parity check matrix for which "some rearrangement of the columns might be necessary." That is, though Kim discloses a rearrangement of columns, a rearrangement of columns **based on the values of elements** is not taught by Kim. Therefore, the Applicants respectfully submit that Kim fails to disclose, implicitly or explicitly, a rearrangement of the columns "based on values of elements in the columns," as recited in claim 21.

Furthermore, the Examiner cites col. 4, line 51 through col. 5, line 29 of Tong as evidence that the determining of a cross-point to generate a triangular matrix is well known in the art. However, Tong discloses a parity triangle that "is a matrix derived from the coefficients of the generator polynomial" wherein "each row from the bottom upward is the preceding row simply shifted one place to the left" and "columns to the left of the leftmost bit position of the bottom row have been deleted." Contrary to Tong, claim 21 recites: a determining of a cross-point between a diagonal line of a parity matrix part in the parity check matrix and a reordered diagonal line defined by values of elements in each column of the reordered parity check matrix; and a performing of column permutations on the reordered parity check matrix according to positions of elements relative to a horizontal line that passes through the cross-point to generate a triangular matrix. That is, the generating of the triangular matrix as recited in claim 21 is patentably distinct from the triangular matrix disclosed by Tong, which is generated by shifting preceding rows one place to the left and deleting a leftmost column as opposed to column permutations based on a cross-point of diagonal lines and a relative position of elements. The Applicants respectfully submit that Tong fails to implicitly or explicitly disclose, teach, or suggest a triangular matrix generated by determining a cross-point between diagonal lines of the parity check matrix and rearranging columns based on the positions of elements relative to a horizontal line passing through the cross-point, as recited in claim 21.

Regarding the rejections of claims 22-25, it is noted that these claims depend from claim 21 and are, therefore, allowable for at least the reasons set forth above.

Regarding the rejection of independent claim 26, it is noted that claim 26 recites a reordering of a plurality of columns of the parity check matrix "based on values of elements in each column." In contrast, the reference to Kim only discloses a parity check matrix for which "some rearrangement of the columns might be necessary." That is, though Kim discloses a rearrangement of columns, a rearrangement of columns **based on values of elements in each**

column is not taught by Kim. Therefore, the Applicants respectfully submit that Kim fails to disclose, implicitly or explicitly, a rearrangement of the columns "based on values of elements in each column," as recited in claim 26.

Furthermore, the Examiner cites col. 4, line 51 through col. 5, line 29 of Tong as evidence that the determining of a cross-point to generate a triangular matrix is well known in the art. However, Tong discloses a parity triangle that "is a matrix derived from the coefficients of the generator polynomial" wherein "each row from the bottom upward is the preceding row simply shifted one place to the left" and "columns to the left of the leftmost bit position of the bottom row have been deleted." Contrary to Tong, claim 26 recites: a determining of a cross-point between a diagonal line of a parity matrix part in the parity check matrix and a reordered diagonal line defined by a position of an element having a first value in each column of the reordered parity check matrix; and a performing of column permutations on the reordered parity check matrix on the basis of positions of elements having a second value relative to a horizontal line that passes through the cross-point to generate a triangular matrix. That is, the generating of the triangular matrix as recited in claim 26 is patentably distinct from the triangular matrix disclosed by Tong, which is generated by shifting preceding rows one place to the left and deleting a leftmost column as opposed to column permutations based on a cross-point of diagonal lines and the value and relative positions of elements. The Applicants respectfully submit that Tong fails to implicitly or explicitly disclose, teach, or suggest a triangular matrix generated by determining a cross-point between diagonal lines of the parity check matrix and rearranging columns based on the positions of elements relative to a horizontal line passing through the cross-point, as recited in claim 26.

Moreover, the Examiner cites FIG. 6 and col. 10, lines 8-47 of Tong as evidence that the permutation of rows and columns to form an extended triangular matrix is well known in the art. However, it is noted that FIG. 6 and col. 10, lines 8-47 do not disclose, either implicitly or explicitly, a generation of a triangular matrix or extension of a triangular matrix; rather, FIG. 6 and col. 10, lines 8-47 disclose a "correction of errors in a code," and, specifically, a transmission of "an arbitrary stream of information bits... including two random errors" and "the manner in which [an] output signal corrects the erroneous bits in the received data stream." As discussed above, the parity triangle disclosed by Tong (col. 4, line 51 through col. 5, line 29) "is a matrix derived from the coefficients of the generator polynomial" wherein "each row from the bottom upward is the preceding row simply shifted one place to the left" and "columns to the left of the leftmost bit position of the bottom row have been deleted." The triangular matrix generated in claim 26 is distinguished from the parity triangle of Tong for the reasons discussed above. Furthermore,

after careful review of Tong, the Applicants respectfully submit that Tong fails to implicitly or explicitly disclose, teach, or suggest an extended triangular matrix formed by performing row and column permutations, as recited in claim 26.

Regarding the rejections of claims 27-30, it is noted that these claims depend from claim 26 and are, therefore, allowable for at least the reasons set forth above.

Based on the foregoing, this rejection is respectfully requested to be withdrawn.

CONCLUSION:

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.
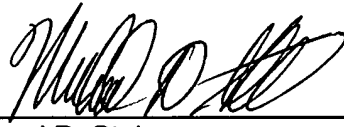
Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 503333.

Respectfully submitted,

STEIN, MCEWEN & BUI, LLP

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